

Summary Sheet

Siphonic Roofwater Systems

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A siphonic roofwater system is a measure used to harvest and reuse runoff collected from larger buildings.

Siphonic roofwater systems are an efficient way to harvest roofwater (rain) that falls on high-rise, multi storey residential buildings or large commercial and industrial buildings.

Siphonic roofwater systems are a relatively recent innovation in roof and building drainage design. They utilize the height of the building (buildings over 4.5m in height) to create negative pressures in the pipework. This allows the system to suck water out of the gutters at high velocities and flow rates.

Because the system flows under pressure, the majority of the pipework can be horizontal rather than vertical. A greatly reduced number of downpipes is then required – quite often one or two. This means that there is only need for one or two rainwater tanks for storing the harvested water.

Therefore siphonic roofwater systems and their associated storage and reuse systems offer a new and efficient way to implement WSUD in highly urbanised environments.

What is Water Sensitive Urban Design?

Water Sensitive Urban Design (WSUD) is an approach to urban planning and design that integrates the management of the total water cycle into the urban development process.

WSUD incorporates all water resources, including surface water, groundwater, urban and roof runoff, drinking water and wastewater. It includes:

- Integrated management of groundwater, surface runoff (including stormwater), drinking water and wastewater to protect water related environmental, recreational and cultural values;
- Storage, treatment and beneficial use of runoff (at building and street level, including stormwater);
- Treatment and reuse of wastewater; and
- Using vegetation for treatment purposes, water efficient landscaping and enhancing biodiversity and amenity.

There are many different WSUD measures which together form a 'tool kit' from which individual measures can be selected to form a specific response suiting the characteristics of each development (or redevelopment).

Those measures are described in detail in the WSUD Technical Manual, which can be found online at www.planning.sa.gov.au/go/wsud

Siphonic Roofwater Systems is one such measure.

Purpose

Siphonic roofwater systems operate passively, meaning there are no pumps or other electric systems. This is because the gutters are primed solely by an increasing the depth in the gutter.

Siphonic systems require minimal vertical pipework, most of it is horizontal and so can be incorporated in the space just below the roof surface. Horizontal collector pipes bring together the roofwater flows at one or two strategically place down pipes where the runoff is then harvested into storage tanks.

Application and Scale

The typical application scale for siphonic roofwater harvesting systems is the property (building) and the street (precinct) scale. In either case, it is often possible to harvest 100% of the rainwater falling on the roofwater system, which requires significant storage systems to be incorporated into the design.

Legislative Requirements and Approvals

All siphonic systems should be designed to satisfy AS 3500 Part 3.1: Stormwater drainage.

It is important to check whether there are any planning regulations, building regulations or local health requirements that apply to such systems in your area before undertaking concept designs of a siphonic roofwater harvesting system.

A thorough investigation of required permits and approvals should be undertaken as part of the conceptual design of any siphonic system. A proposed system also needs to meet the requirements of the following legislation:

- *Development Act 1993*; and
- *Environment Protection Act 1993*.

Design Considerations

- The design for the system should be in accordance with the Australian Standard AS3500.3.2 for all roof areas. The whole of the roof drainage system should be provided with a 100% overflow system.
- All pipe and fittings should be HDPE, PN4 or greater or other approved material manufactured in accordance with AS4130 (or equivalent) and installed generally in accordance with AS2033.
- Siphonic inlet bodies should be stainless steel and should be fixed generally in accordance with AS2179. The inlet should be fitted with baffles designed to restrict the entry of air to the system and there should be made of a durable material. All inlets are to be self-priming to avoid a build-up of water within the gutter system.
- The collecting mains and downpipes should be supported generally in accordance with the intent of AS2180. The pipework support system should take into account the weight of pipe and water, vibrations and thrust forces.

- The siphonic system should be installed only by a full trained and qualified personnel employed directly by the siphonic roof drainage contractor.
- Acoustic treatment to piping may be required in accordance with the acoustic engineer's requirements.
- The completed siphonic system should be connected to a rainwater tank with sufficient overflow relief.
- Routine maintenance schedule should be undertaken to ensure the system is working at optimum efficiency. The frequency of the system maintenance will depend on the site conditions, and maintenance procedures should be timed to suit.

Design Process

The key steps in the design process include:

- Determine the maximum design flowrate from the roof catchment surfaces in order to convey runoff from the roof and gutters safely to ground level and protect the building and its contents from water damage.
- Determine the number of siphonic outlets required for each gutter system according to the maximum flowrate that each outlet can accommodate.
- Determine the optimum outlet spacing and pipe lengths as the positioning of the siphonic outlets plays a significant role in the height of water in the gutter.
- The design of the collector pipe and tailpipe configurations should be done in conjunction with the architect at the design stage. The pipe layout depends on many design variables such as the available space restrictions and placement of the horizontal collector pipework.
- Undertake hydraulic balancing of pipes and tailpipes to available disposable head to ensure that the driving head from the building's height is utilised effectively. This will ensure equal flowrates at all outlets.

Maintenance Requirements

Siphonic systems should be maintained in the same way the conventional gravity roof and gutter systems are maintained. Removal of leaf, sediment and other debris from roof and gutter systems is essential to maintain optimal performance if the system.

It is important to establish a general maintenance program to ensure the siphonic system continues to provide satisfactory performance. Simple, pre-scheduled clearing of debris and cleaning will maintain the system in good condition.

Further Information

While there is a large range of useful resources and further information available on siphonic roofwater systems, in the first instance it is suggested that people read Chapter 16 of the Water Sensitive Urban Design in Greater Adelaide Technical Manual. Further information is available at www.planning.sa.gov.au/go/wsud

Other Summary Sheets

Other Water Sensitive Urban Design Summary Sheets for the Greater Adelaide Region are available in this series. To download the summary sheets, visit www.planning.sa.gov.au/go/wsud

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